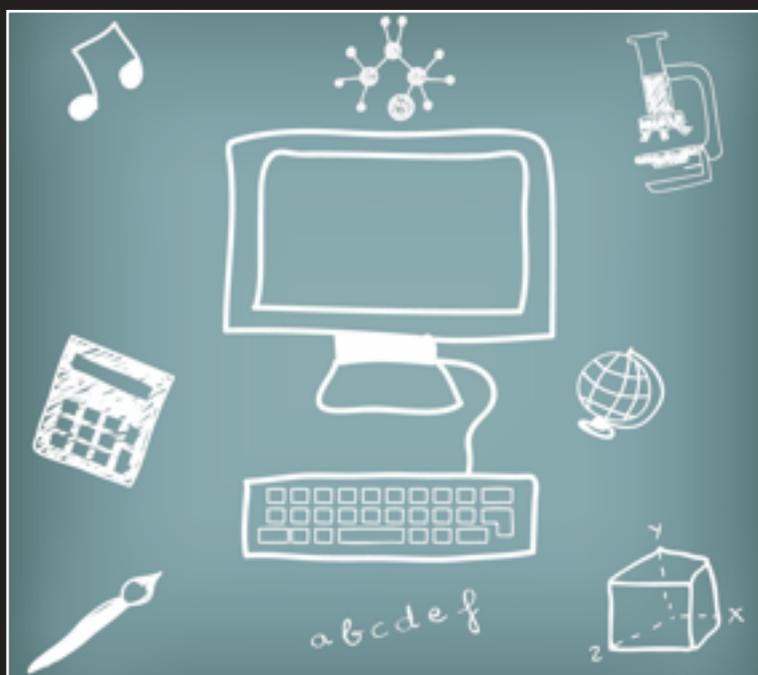


JUANJO MENA, ANA GARCÍA-VALCÁRCEL,
FRANCISCO JOSÉ GARCÍA PEÑALVO,
MARTA MARTÍN DEL POZO (EDS.)

SEARCH AND RESEARCH: TEACHER EDUCATION FOR CONTEMPORARY CONTEXTS



International Study
Association of Teachers
and Teaching



JUANJO MENA, ANA GARCÍA-VALCÁRCEL
FRANCISCO JOSÉ GARCÍA-PEÑALVO,
MARTA MARTÍN DEL POZO (EDS.)

SEARCH AND RESEARCH:
TEACHER EDUCATION
FOR CONTEMPORARY CONTEXTS



Ediciones Universidad
Salamanca

AQUILAFUENTE, 227

©

Ediciones Universidad de Salamanca
y los autores

1ª edición: julio, 2017
ISBN: 978-84-9012-769-8 (pdf en Pen Drive) / D.L.: S 231-2017
Ediciones Universidad de Salamanca
Plaza San Benito s/n
E-37002 Salamanca (España)
<http://www.eusal.es>
eus@usal.es

Realizado en España-Made in Spain

Realizado por:
Cícero, S. L.
Tel.: 923 123 226
37007 Salamanca (España)

Maquetación:
Marta Martín del Pozo

*Todos los derechos reservados.
Ni la totalidad ni parte de este libro
puede reproducirse ni transmitirse sin permiso escrito de
Ediciones Universidad de Salamanca.*

Ediciones Universidad de Salamanca es miembro de la UNE
Unión de Editoriales Universitarias Españolas
www.une.es



CEP. Servicio de Bibliotecas

SEARCH and research : teacher education for contemporary contexts / Juanjo Mena, Ana
García-Valcárcel, Francisco José García Peñalvo, Marta Martín del Pozo (eds.).

—1a. ed.—Salamanca : Ediciones Universidad de Salamanca, 2017

1 memoria USB (1190 p.).—(Aquilafuente ; 227)

Tít. tomado de la página de inicio

Contiene los preprints del “18th Biennial Conference on Teachers and Teaching,
3-7 July 2017 University of Salamanca, Spain”

Sistema requerido: Adobe Acrobat

1. Docentes-Formación continuada. I. Mena Marcos, Juan José, editor. II. García-
Valcárcel

Muñoz-Repiso, Ana, editor. III. García Peñalvo, Francisco José, editor.

IV. Martín del Pozo, Marta, editor.

3719.13



ONIX disponible en DILVE <https://www.dilve.es/>

CONTENTS

| | |
|------------------------|-----|
| Foreword | i |
| Preface | iii |
| Acknowledgements | v |
| Introduction | 1 |

PART I. The development of knowledge and understanding of teaching practices 5

| | |
|--|-----|
| The universe of supervision: an inclusive approach within the teacher training domain (<i>Elsa Morgado, Mário Cardoso, João Rodrigues, and Levi Silva</i>)7 | |
| Learning to be Practitioner Inquirers and Researchers: Lessons from a Teacher Education Program (<i>Meher Rizvi</i>) | 17 |
| The added value of encouraging morally courageous behavior via initial teacher education- Insights from the Stories of Israeli Educators (<i>Roni Reingold, and Lea Baratz</i>)..... | 27 |
| “Who can support me?”: Studying teacher leadership in a Hong Kong primary school (<i>Yuen-Shan Tse, Sally Wai-Yan Wan, Thomas Wing-Ki Lee, Wing-Ki Tsang, Vincent Kin-Chung Cheung, Ylena Yan Wong, Kelvin Shing-Pan Chong, Zachary Hon-Fung Ng, and Ada Wing-Tung Wan</i>)..... | 37 |
| Partnerships and relationships to support student teacher’s self-regulated learning (<i>Lyn McDonald</i>) | 55 |
| Manifestation the levels of teachers professional agency: toward a conceptual framework (<i>Khalil Gholami</i>)..... | 63 |
| Perceived preparedness and teaching beliefs of differentiated instruction: From prospective teachers’ perspective (<i>Sally Wai-Yan Wan</i>)..... | 73 |
| Undergraduate degrees and basic education early years: a necessary interlocation in teacher education (<i>Joana Paulin Romanowski, Pura Lucia Oliver Martins, and Simone Regina Manosso Cartaxo</i>)..... | 101 |
| Teacher Education Needs an Epistemology of Practice (<i>Tom Russell, and Andrea K. Martin</i>)..... | 111 |

| | |
|---|-----|
| Evaluation of the tutoring process with teachers in elementary schools in Mexico (<i>Juan Manuel Manzano-Torres, Leonardo David Glasserman-Morales, and Juanjo Mena</i>)..... | 119 |
| Perspectives of teachers on the reputation of their profession in society (<i>Barbara Šteb, Jana Kalin, and Renata Čepić</i>)..... | 129 |
| Rethinking modeling in pre-service teacher education: implications for teacher educators (<i>Manuel Goizueta, Helena Montenegro Maggio, Francisco Rojas Sater, and María Paz González Vallejos</i>)..... | 139 |
| Pedagogical confrontations as a lens for reflective practice in teacher education (<i>Wendy Moran, Robyn Brandenburg, and Sharon McDonough</i>)..... | 149 |
| What Counts as Expert Practice? A Discursive Analysis of Experienced Teachers' Perceptions (<i>Marc Turu</i>) | 159 |
| A Narrative Inquiry Into Taiwanese Grade School Teachers' Practice of Chinese as a Foreign Language in the Philippines (<i>Chih-Pu Dai</i>)..... | 169 |
| Studentship: Beyond normative conceptions of civic education in Québec's ERC program (<i>Ilham Reda, and Erin Reid</i>) | 179 |
| Acknowledging complexity: teaching practices at the core (<i>Kathleen Feremans, Jan Elen, Ele Holvoet and Tim Christiaens</i>) | 189 |
| U.S.-educated and Taiwan-educated Taiwanese Teachers of English: Capital and Agency (<i>Pei-Chia Liao</i>) | 199 |
| Continuous teacher education - a study based on the phases and cycles elaborated by Huberman (<i>Alboni Marisa Dudeque Pianovski Vieira</i>)..... | 209 |
| Modeling Changes in Teacher Efficacy during In-Service Professional Development in Trinidad and Tobago (<i>Sharon J. Jaggernauth</i>)..... | 217 |
| The reflexive diaries of mentors in an induction program (<i>Carmen Gallego-Domínguez, Paulino Murillo Estepa, and Carlos Marcelo García</i>)..... | 227 |
| Building teacher professional identity strategies: discourse analysis of Teacher Training Course student's textual narratives (São Paulo/Brazil) (<i>Luciana Maria Viviani, Verónica Marcela Guridi, and Elen Faht</i>) | 237 |
| Student Teachers' Journey in Professionalism (<i>Birsen Tütüniş, and Duygu Yalman</i>) | 247 |
| Teaching as a discursive practice: new perspectives for teacher education (<i>Helena Montenegro</i>)..... | 259 |
| Teachers' professional development in the context of a nation-wide project on reading literacy (<i>Bara Olga Marentič Požarnik, and Fani Nolimal</i>) | 269 |

| | |
|--|-----|
| Teacher Learning with Assessment in Singapore: Classroom Assessment as Searching and Researching into Teaching (<i>Heng Jiang</i>)..... | 279 |
| Mediation Learning in Classroom: A study with teachers and trainees (<i>Tatiane Lebre Dias, Sônia Regina Fiorim Enumo, and Kelly Ambrozio Silveira</i>) | 289 |
| The mediation of Philosophy subject matter. A comparative case study (<i>Laura Sara Agrati</i>)..... | 299 |
| Investigating EFL Elementary Student Teachers' Development in a Professional Learning Practicum (<i>Chiou-hui Chou</i>) | 309 |
| Utility of the professional diary to perfect teaching practice (<i>Paula Martín Gómez, and M^a Luisa García Rodríguez</i>)..... | 319 |
| Confronting the problem of embodiment in education (<i>Luíz Sanches Neto, and Alan Ovens</i>) | 329 |
| Influence of learning attitudes and task-based interactive approach on ESL-student satisfaction and perceived learning outcomes in a research methodology course (<i>Leah Li Echiverri, and Keith Lane</i>) | 337 |
| Peer enhancement of learning and teaching for teacher educators (<i>Jenene Burke, Margaret Plunkett, and Boli Li</i>) | 347 |
| Responsive teachers in inclusive practices (<i>Hafþís Guðjónsdóttir, Edda Óskarsdóttir, and Jóhanna Karlsdóttir</i>) | 357 |
| An attempt to study different forms of supportive roles in school based professional development. Significant elements and similarities (<i>George Bagakis</i>) | 367 |
| Thai Rural Science Teachers' Self-Perceptions about Efficacy, Confidence and Attitude toward STEM Education (<i>Siroj Srisarakorn, and Chatree Faikhamta</i>) | 375 |
| Knowing the pre-service teachers' beliefs in order to promote equity, inclusion and quality. Validation of a scale on teachers' motivations (MTS) (<i>Andrea Ciani, and Ira Vannini</i>)..... | 385 |
| Emancipatory teaching practices in the understandings of Social Sciences teachers on a Diploma of Education programme (<i>Stephen Geofroy, Benignus Bitu, Dyann Barras, Samuel Lochan, Lennox McLeod, Lystra Stephens-James, and Antoinette Valentine Lewis</i>) | 397 |
| History curriculum and national identity: a search on teaching practices in Southern Italian School (<i>Loredana Perla, and Viviana Vinci</i>) | 409 |

| | |
|--|-----|
| Narrative of experience from school physical education: the case of a Brazilian woman (<i>Luciana Venâncio</i>) | 419 |
| Teacher' personal theories of knowledge development (<i>Riaz Hussain, and Meher Rizvi</i>)..... | 429 |
| From fetishism to narcissism – The ideological appeal of the policies for higher education in Brazil (<i>Rosimê da Conceição Meguins</i>)..... | 437 |
| Secondary school teachers and their academic training: The opinion of its protagonists (<i>Iria Calleja-Barcia, and Margarita Pino-Juste</i>)..... | 445 |
| Primary school teachers' professional agency in the course of an in-service training programme (<i>Merja Kauppinen, Johanna Kainulainen, Päivi Hökkä, and Katja Vähäsantanen</i>)..... | 455 |
| Teacher collaboration and professional development: findings from a case study (<i>Maria Manuela Unas, Sandra Raquel Gonçalves Fernandes, Eusébio André Machado, and Maria Assunção Flores</i>)..... | 465 |
| School leadership: results from a case study at a teacher training school in Benguela province (<i>Marta Abelha, Justino Kayumbuka, Ana Sílvia Albuquerque, and Eusébio André Machado</i>)..... | 475 |
| Plotlines in preservice teachers' relationships with second language learners (<i>Stefinee Pinnegar, Celina Lay, Linda Turner, Jenna Granados, and Sarah Witt</i>) | 485 |
| Instructional collaborative practices: a Brazilian case study (<i>Ana Paula Bossler and Pedro Z. Caldeira</i>)..... | 495 |
| “It is important to look into own practice” Developing teacher education pedagogy in drama (<i>Ása Helga Ragnarsdóttir, and Hafðís Guðjónsdóttir</i>)..... | 505 |
| Am I a teacher educator? Search of self identity (<i>Manpreet Kaur</i>) | 515 |
| Integrating Theory and Practice in Initial Teacher Education (<i>Maria Inês Marcondes, Vânia Finholdt Angelo Leite, and Rosane Karl Ramos</i>)..... | 525 |
| The practicum model in Teacher Education studies of the University of Girona: connecting theory and practice (<i>Mariona Masgrau-Juanola, Víctor López-Ros, Josep Maria Serra-Bonet, and Margarida Falgàs-Isern</i>) | 535 |

PART II. Teacher Education and competencies: social competencies, problem-solving competences, and pedagogical competencies 545

| | |
|--|-----|
| Initial training of future teachers of Secondary Education: an assessment of the pedagogical competences acquired (<i>Marcos Cabezas, and Sonia Casillas</i>)..... | 547 |
| Strengthening social competencies and problem solving competencies in the children: early interventions (<i>Anjali Shokeen</i>)..... | 557 |
| Complex theoretical construction about the evaluation indicators of the permanent training plan of the teacher of the IUTPC (<i>Katty Ramirez de Velásquez</i>)..... | 567 |
| Development of professional skills on teaching practice: student teachers' and mentor teachers' views (<i>Hana Horká, and Jana Kratochvílová</i>)..... | 579 |
| The importance of resilience in beginning teachers (<i>Gloria Gratacós, Santiago Sastre, Inmaculada Rodríguez, and Monika Ciesielkiewicz</i>) | 591 |
| Function of teaching practices in the acquisition of professional knowledge (<i>Raquel Gómez Sánchez, María Luisa García Rodríguez, and Juanjo Mena Marcos</i>)..... | 605 |
| Are researching skills taught in the practicum for the degree of early childhood education at Salamanca University? (<i>Marisa García, and Marta Franco</i>) | 615 |
| Pre-service teachers' perspectives on their experience in a school-based Practicum. A mixed methods approach (<i>Ana M^a Pinto-Llorente, Marcos Cabezas-González, and Sonia Casillas-Martín</i>)..... | 625 |
| Integrated strategy to investigate competence-based training and teacher development in Secondary and University education (<i>María Concepción Domínguez, Fuensanta Hernández-Pina, Antonio Medina, Ernesto López-Gómez, Vito José de Jesús Carioca, and Fernando Ribeiro Gonçalves</i>)..... | 637 |
| Providing the Competencies for the Future in University. A Case Study (<i>Andron Daniela Roxana</i>) | 647 |
| Pedagogic training disciplines of the Program for Teaching improvement in the post-graduation of the USP campus of Ribeirão Preto: challenges and possibilities (<i>Noeli Prestes Padilha Rivas, and Glancia Maria da Silva</i>).... | 659 |

PART III. Engaging learning environments for sustainability of learning and teaching practices 667

- Inclusive classroom: Teacher–student relationships (*Outi Kyrö-Ämmälä, Suvi Lakkala, and Tuija Turunen*) 669
- Advantages of extracurricular activities for rural environment students (*Margarita Pino Juste, and Lucía Pumares Lavandeira*) 679
- Respondents to, or agents of, change? Teaching ‘soft skills’ in a school–university partnership project (*Michelle Ludecke*) 689
- Playing with LEGO-bricks as an innovative pedagogical tool at pre-university and university levels for teaching urbanism (*Inmaculada Mobino, Eloy Solis, and José María Coronado*) 701
- Project-Based Learning: Three College Collaborative Learning Experiences (*Alicia de la Peña, Nuria Mendoza, and Teresa Lamas*) 729
- Designing and Implementing Engaging Learning Environments: Kindergarten Teachers’ Perceptions in three Chinese Societies (*Peng Xu, Haidan Liu, Jing Li, and Beibei Shi*) 737
- Transforming Schooling Through Student Advocacy (*Bernie Neville*) 747
- Rube Goldberg machines and STEM education: a Brazilian case study (*Pedro Z. Caldeira, and Ana Paula Bossler*) 755
- If two-thirds of classroom talk is still by the teacher: the kind of science teacher’s talk and use of language during teaching for all learners in any science classroom (*Samuel Ouma Oyoo*) 765
- When attention to proficiency in, context of use and precision in use, and polysemy [nature of the science language] counts best during science teaching (*Samuel Ouma Oyoo*) 773
- Innovative field experiences in teacher education: An evaluation of sequential and parallel teaching by student teachers, mentors and pupils (*Mathea Simons, and Marlies Baeten*) 781
- An Excel® application for calculus in Geomatics Engineering (*Carlos Enríquez, María Isabel Ramos, and Manuel López*) 791
- Worlds of Curriculum Making (*Eliza Pinnegar*) 805
- “Shared vision? It’s not my business!” Hong Kong prospective teachers’ perceptions of professional learning communities (PLC) (*Sally Wai-Yan Wan, Zachary Hon-Fung Ng, Yuen-Shan Tse, Alice Hoi-Yan Hui, Rita Hau-*

| | |
|--|-----|
| <i>Kwan Lau, Ylena Yan Wong, Archie Chong-Kwai Yeung, and Heidi Hoi-Ki Chan</i>) | 813 |
| Prospective teachers' teaching beliefs about differentiated instruction in Hong Kong and Turkey (<i>Sally Wai-Yan Wan, and Ruban Karadag</i>)..... | 823 |
| Jottings for the modernization of professional practices in the first stages of the training of mathematics teachers. A screening by nodes of praxeological configuration (<i>Juan Albadan</i>)..... | 837 |
| Theory becomes practice in community: Applying community of practice theory to doctoral education (<i>Özge Hacifazlıoğlu, Kate Olson, David Lee Carlson, and Christopher Michael Clark</i>) | 847 |
| Professional insertion as a reflexive process (<i>Helena Amaral da Fontoura, and Filomena de Arruda Monteiro</i>) | 855 |
| Students' Perceptions of Online Cultural Exchanges (<i>Hsiao-fang Cheng</i>) . | 863 |
| Coaching in education: what are we talking about? (<i>M. Carmen González-Valderas</i>)..... | 871 |
| Storytelling and living praxis in the pre-service teacher classroom (<i>Brian Mundy</i>)..... | 881 |
| The Attention-Deficit Hyperactivity Disorder (ADHD) in the school context (<i>Luís Martins Oliveira, Marcelino Arménio Pereira, Teresa Pires Medeiros, and Ana Maria Serrano</i>)..... | 893 |
| Building a Professional Community of Teacher Educators through a Self-Study Network in Chile (<i>Rodrigo Fuentealba, Tom Russell, and Carolina Hirmas</i>) | 903 |
| Could self-determined learning be a useful method to increase self-efficacy in mathematics and to reduce math anxiety? (<i>Marcut Ioana Gabriela</i>) | 911 |
| The DidaSco Project: a training program for the teachers' professional development (<i>Loredana Perla, Viviana Vinci, and Laura Sara Agrati</i>)..... | 921 |
| How and why classroom discourse can enhance students learning and achievement (<i>Pedro Z. Caldeira ,and Ana Paula Bossler</i>)..... | 931 |
| What evaluates teachers in training and teacher in exercise of primary education about human nutrition? (<i>Juan Carlos Rivadulla-López, María-Jesús Fuentes-Silveira, and Cristina Martínez Losada</i>)..... | 941 |
| The Development of Beginning Chemistry Teachers' Understandings of and Ability to Translate the Nature of Science Within a PCK-Based NOS Program (<i>Surayot Supprakob, Chatree Faikhamta, and Potjanart Suwanruji</i>)... | 951 |

| | |
|---|-----|
| Developing STEM Teachers through both Informal and Formal Learning Experiences (<i>Donna Stokes, Paige Evans, and Cheryl Craig</i>) | 961 |
| Language and literacy development for English language learners: Exploring the potential of literacy events (<i>Jason Jay, Mike Richardson, Alessandro Rosborough, and Brad Wilcox</i>) | 973 |
| Building teacher professional identities: required knowledge according to Teacher Training Course student narratives (São Paulo/Brazil) (<i>Celi Rodrigues Chaves Dominguez, Valéria Cazetta, Luciana Maria Viviani, Josely Cubero, and Fabiana Curtopassi Pioker-Hara</i>) | 983 |
| Changing teacher education scenario in india: issues and challenges (<i>Balwant Singh, and Manpreet Kaur</i>)..... | 993 |

PART IV. Innovatives practices and ICT.....1003

| | |
|---|------|
| Teachers' Digital Skills training by using the Educational Innovation based on Evidence methodology (EIBE) (<i>Celia Paola Sarango-Lapo, Juanjo Mena, and María-Soledad Ramírez-Montoya</i>) | 1005 |
| Education, Cinema and Science Teacher Education Program: the right to gaze at the gaze of the camera (<i>Valéria Cazetta, Celi Rodrigues Chaves Dominguez, Fabiana Curtopassi Pioker-Hara, and Josely Cubero</i>)..... | 1015 |
| Use of Virtual Labs in Health Sciences Degrees (<i>Juan José Serrano-Pérez, Isabel García-Arnandis, Nicla Flacco, Lorena González, Ana Pellín-Carcelén, Carlos Romá-Mateo, Gonzalo Pérez-López, and Alida Taberner-Cortés</i>) | 1025 |
| Can mobile devices help students improve their academic results? (<i>Laura Cabeza García, Daniel Alonso Martínez, Nuria González Álvarez, and José Luis de Godos Díez</i>)..... | 1037 |
| A proposal of indicators for assessing the digital competence of 12 year olds: a model adapted from DIGCOM 2.0 (<i>Sonia Casillas Martín, Ana García-Valcárcel Muñoz-Repiso, Ana M^a Pinto Llorente, Luís González Rodero, and Verónica Basilotta Gómez-Pablos</i>) | 1051 |
| Diagnostic assessment of the conceptual knowledge of technology in future teachers of Early Childhood Education (<i>Sonia Casillas, Marcos Cabezas, and Ana María Pinto</i>) | 1061 |

| | |
|---|------|
| Study on the personal indicators that influence the development of digital competence in primary education students (<i>Marta Martín del Pozo, and Marcos Cabezas González</i>)..... | 1071 |
| Video games and higher education students from the Degree in Pedagogy: Attitude towards collaborative learning with video games and other related variables (<i>Marta Martín del Pozo, Verónica Basilotta Gómez-Pablos, and Ana García-Valcárcel Muñoz-Repiso</i>)..... | 1081 |
| Parallel Stories: Teachers and Facilitators in a Transformative Online Teacher Learning Community (<i>Jing Li, Xiaohong Yang, and Cheryl J. Craig</i>) | 1093 |
| How to improve understanding using 3D objects in eBooks and augmented reality (<i>Rocio Ruiz Rodarte</i>)..... | 1101 |
| The reflective professor's training and the use of technology in education (<i>Tiago Bacciotti-Moreira</i>) | 1111 |
| What skills do I need to teach online? Researching experienced teacher views of essential knowledge and skills in online pedagogy as a foundation for designing professional development for novice teachers (<i>Catherine McLoughlin, and Maria Northcote</i>) | 1119 |
| Collaborative work with Android Applications: research and practice (<i>María Teresa González, Yuliet Coello, María José Cáceres, José Chamoso, and Myriam Codes</i>) | 1131 |
| The use of video during professional experience for initial teacher education (<i>Michael Cavanagh</i>)..... | 1141 |
| Knowledge pills skills as a resource of Learning in Blended Learning (<i>David Caballero Franco, Margarita Hernández Sánchez, Judith Martín Lucas, and Sara Serrate González</i>)..... | 1151 |
| Free Flowing Content: Unlocking the full potential for transitioning to e-learning at the institution scale (<i>Andrew Knox Cass, and Mariia Kravchenko</i>) | 1161 |

A proposal of indicators for assessing the digital competence of 12 year olds: a model adapted from DIGCOM 2.0

Sonia Casillas Martín¹, Ana García-Valcárcel Muñoz-Repiso², Ana M^a Pinto Llorente³, Luís González Rodero⁴, and Verónica Basilotta Gómez-Pablos⁵

¹*Universidad de Salamanca*
scasillasma@usal.es

²*Universidad de Salamanca*
anagy@usal.es

³*Universidad Pontificia de Salamanca*
ampintoll@upsa.es

⁴*Universidad de Salamanca*
lgrodero@usal.es

⁵*Universidad de Salamanca*
veronicabgp@usal.es

ABSTRACT

Digital competence is one of the key competences citizens should have acquired by the time they finish the compulsory stages of education so that they can satisfactorily cope with adult life and be able to follow learning processes throughout their lives (European Commission, 2007).

We now face the challenge of assessing this competence in a rigorous way at the end of Primary Education. This has become one of the objectives of the research project called “Assessment of the digital competence of students of compulsory education and a study of the impact of socio-family variables”, financed by the Spanish Ministry of Economy and Competitiveness (EDU2015-67975-C3-3-P) currently being implemented by the GITE-USAL research group of the University of Salamanca.

For the assessment process we started with the European model, DIGCOM (Ferrari, 2013), which identifies five large areas: information, communication, creation of contents, security and problem-solving. Based on this model, specific indicators were identified for the population in question (12-year-old children), which were then validated by experts, both specialists and teachers involved in the final year of Primary Education.

The present paper thus presents the indicators of the model established to carry out the assessment of digital competence in students finishing Primary school (12 yrs. Of age), which will serve as a foundation for developing task-based assessment instruments focused on problem-solving.

KEYWORDS: digital competence, assessment, primary education, DIGCOM.

1. INTRODUCTION

A report from the European Commission (2008) calls to improve digital

competences of students to be successful succeed in the knowledge society, which would reflect on learning objectives, learning management, self-employment and teamwork and the use of multiple digital technologies. Also intends to stimulate European cooperation of schools as well as to reinforce the threefold dimension of knowledge research-innovation-education.

This paper aims to highlight the first part of an investigation entitled "Evaluation of the digital competences of students of Compulsory Education and study of the incidence of sociodemography variables", funded by the Ministry of Science and Innovation (EDU2015-67975-C3-3-P), focused mainly on identifying, analyzing and evaluating the digital competence of Spanish students at the end of primary education. Research being developed by the research group GITE-USAL.

With the purpose of designing an evaluation test of digital competences for 12 years old students a review of the main international models for the acquisition of these competences has been carried out, with the aim of identifying evaluation indicators. Between all the models and revised proposals it has been decided to follow the areas and competences set out in the DIGCOM model (Ferrari, 2013), which are the basis for defining the elaborated model of evaluation indicators.

2. THEORETICAL FRAMEWORK

The development of skills to use, effectively, creative and critical way, different types of devices and digital applications, both at home and at school or at work, is one of the most significant referents of the knowledge economy. The Organization for Economic Cooperation and Development (OECD, 2014) foresees that technologies will continue to be a key driver in the creation of employment, and it encourages the development of ICT competences as one of the most important strategies for economic recovery policies.

That is why the European Union considers, precisely, the incorporation of information and knowledge into the Society as one of its strongest elements of cohesion. Already since 2000, the OECD realizes its visible economic effects and exposes the essential "competences" to successfully join the development model supported by Internet (Van Deursen & Van Dijk, 2011), especially since the new economic conditions, social and cultural, supported by technologies, have made the mastery of reading and writing insufficient for an effective active incorporation into society.

Not only are required abilities and skills in the use of ICT and Internet access, but a mastery of new technological environments, both as personal and social training purposes (see the DeSeCo final report in Rychen & Salganik 2003; or

the DIGCOMP Report, in Ferrari, 2013).

If we focus on the evaluation of competences, according to Castro (2010, p. 118), we can speak of "a procedure that requires the student to complete tasks or processes that demonstrate you're his ability to apply knowledge and skills, or apply knowledge in simulated situations similar to real life". Obviously, considering that the combinations of real problems and contexts can be infinite (Zabala and Arnau, 2007).

In addition, if we understand that competence involves the effective acquisition of knowledge, skills and attitudes, it only can be verified and confirmed by comparing the acquisition of that skill with a previously established criteria, resulting, in this way, more appropriate if it is evaluated so integral and not each of its elements separately (Villa & Poblete, 2011, De la Orden, 2011). The evaluation of the performance of a competition requires often establish levels of acquisition of the same domain. (Villa & Poblete, 2008).

Code et al. (2011, p. 235) emphasize that in order to develop an effective competency assessment, "it requires the analysis of cognitive processes and structures that contribute to the performance of the tasks". At the same time, "to estimate the mastery of the most relevant knowledge, its application to solve the problems of the profession and the advancement in the values and attitudes more consistent with the deontology required for its performance" (Medina et al, 2013, p. 242).

In this sense, the DIGCOM model (Ferrari, 2013) offers a conceptual framework of reference to identify the components of the Digital Competence of great acceptance at national and international level. The model is structured in five dimensions: 1) Information; 2) Communication; 3) Creation of content; 4) Security and 5) Troubleshooting

3. METHODOLOGY.

Taking into account the objectives of the research, a documentary review of assessment models and indicators in the areas of digital competence took place, especially those related to the DIGCOM model. The documentary revision is a technique that involves the selection and compilation of information through the reading and review documents and bibliographic materials (Avila, 2006).

In a second phase of the research, concrete indicators are formulated for all the competences of the model, for the three levels of domain (initiation, intermediate and advanced), taking into account the reference population. These indicators are discussed by a group of 5 experts on the subject to reach

the final definition of each of the indicators and their location definition at the appropriate domain level.

Once the design phase of the model of indicators is carried out a process of validation by 72 expert judges, (primary and secondary school teachers and university professors specialized in different areas of knowledge) carry out a validation process under criteria of adequacy and relevance. Taking into account the results of this validation, we will introduce the appropriate amendments that allow us to obtain a final proposal of indicators of evaluation of the digital competence for children of 12 years.

4. RESULTS.

This study only shows the three most relevant indicators of competences corresponding to the basic level of the five areas are shown for reasons of extension of the document.

This selection of featured indicators of basic digital competence level, can form the basis for the construction of evaluation test or the design of strategies of development of basic digital competence in students of primary education.

| Area 1: Information | |
|--|--|
| Competences | Key Indicators (basic level) |
| 1.1. Browsing, searching and filtering information | <ul style="list-style-type: none"> - Ability to search information and browse the Internet through a digital device. - Ability to explore information through links. - Active attitude toward the search information. |
| 1.2. Evaluating information | <ul style="list-style-type: none"> - Knowledge of the limits of the Internet as a source of information (reliability of information). - Ability to select different information formats (videos, audios, texts, etc.) according to their interests. - Ability to understand different types of information. |
| 1.3. Storing and retrieving information | <ul style="list-style-type: none"> - Knowledge of different devices/storage services files and contents online and local. - Ability to store files and contents on different local devices. - He/she is aware of the importance of properly storing the information that he/she finds and/or elaborates. |

Table 1: Basic Indicators of the Information Area

| Area 2: Communication | |
|--|--|
| Competences | Key Indicators (basic level) |
| 2.1 Interaction through new technologies | <ul style="list-style-type: none"> - Knowledge of different digital media: email, WhatsApp, videoconference and SMS. - Ability to send an email, a WhatsApp, an SMS to contact |

| | |
|--|---|
| | <ul style="list-style-type: none"> with your friends and family. - Participatory attitude in online communication. |
| 2.2 Share information and contents | <ul style="list-style-type: none"> - Knowledge of how to share content and information with colleagues (photos, videos, files ... etc.). - Ability to share information and digital resources sensibly. - Critical attitude on practices of exchange of information and digital resources, benefits, risks and limits. |
| 2.3 Citizen participation online | <ul style="list-style-type: none"> - Knowledge of how technology can facilitate different forms of citizen participation. - Ability to find different services of citizen participation and social media that correspond to their interests and needs. - Positive attitude towards the use of digital media for citizen participation. |
| 2.4 Collaboration through digital channels | <ul style="list-style-type: none"> - Ability to work from a distance with others. - Ability to use social media for different types of collaboration. - Positive attitude to be part of a team. |
| 2.5. Netiquette | <ul style="list-style-type: none"> - Knowledge of the basic rules of conduct in digital environments. - Ability to protect yourself and others from online threats. - Attitude towards ethical principles of use and publication of information. |
| 2.6 Management of digital identity | <ul style="list-style-type: none"> - Knowledge about the type of information that you must disclose about yourself. - Understands the interrelation between the world inside and outside the network. - Attitude to take care of your digital identity. |

Table 2: Basic indicators of the area of Communication

| Área 3: Digital content Creation | |
|------------------------------------|---|
| Competences | Key Indicators (basic level) |
| 3.1 Developing digital content | <ul style="list-style-type: none"> - Ability to produce simple documents in a word processor. - Ability to make simple presentations. - Interest in making a good presentation of the contents. |
| 3.2 Integrating and re-elaborating | <ul style="list-style-type: none"> - Ability to improve the content of texts written by others with a word processor. - Ability to edit content in presentations made by others. - Critical attitude to value the work of others. |
| 3.3 Copyright and Licenses | <ul style="list-style-type: none"> - Knowledge about the meaning of copyright. - Ability to distinguish resources that do not have copyrights (usable for the works). - Respectful attitude towards the copyright of the content used. |
| 3.4. Programming | <ul style="list-style-type: none"> - Ability to perform an adequate maintenance of the software of the work team (operating system updates, plug-in browsers, ...) |

| | |
|--|---|
| | <ul style="list-style-type: none"> - Ability to install or uninstall programs on devices. - It is aware that changes can be made to existing software configurations. |
|--|---|

Table 3: Basic indicators of the area of Digital content creation

| Área 4: Safety | |
|--------------------------------|--|
| Competences | Key Indicators (basic level) |
| 4.1 Protecting devices | <ul style="list-style-type: none"> - Knowledge about the effects of viruses. - Ability to install antivirus on different devices (computer, tablet, mobile...). - Ability to create secure passwords. |
| 4.2 Protecting personal data | <ul style="list-style-type: none"> - Knowledge about personal information that should not be shared on the Internet. - Using procedures to protect identity when installing or using applications. - Prudence in privacy issues towards himself and others. |
| 4.3 Protecting health | <ul style="list-style-type: none"> - Knowledge of the consequences of prolonged use of the technologies (time invested in Internet use, hearing problems, ocular, postural ...). - Ability to control the time in the use of the Internet. - Ability to build good relationships between peers through social networks. |
| 4.4 Protecting the environment | <ul style="list-style-type: none"> - Knowledge of the environmental problems related to the use of digital technologies. - Ability to take energy-saving measures in the use of technological devices (suspend the system, turn off the screen, disconnect the charger ...). - Attitude of respect to the environment from the technological point of view. |

Table 4: Basic indicators of the area of Safety

| Área 5: Problem solving | |
|---|---|
| Competences | Key Indicators (basic level) |
| 5.1 Solving technical problem | <ul style="list-style-type: none"> - Knowledge of the technical characteristics of the devices, programs and applications that you use. - Ability to identify a technical problem requiring specialized help. - Ability to request help and advice online when a problem arises. |
| 5.2 Identifying needs and technological responses | <ul style="list-style-type: none"> - Basic knowledge of digital tools to carry out daily activities of information, training, communication and leisure. - Ability to use digital tools to carry out daily activities (leisure, learning, communication with friends and family, search for |

| | |
|---|---|
| | <p style="text-align: center;">information, etc.).</p> <ul style="list-style-type: none"> - Positive attitude toward problem-solving technologies. |
| 5.3 Creatively using digital technologies | <ul style="list-style-type: none"> - Knowledge of resources and tools that allow you to develop your creativity. - Ability to use technologies to develop their imagination (telling stories, creating images, posters, etc.). - Positive attitude toward technologies as means of self expression. |
| 5.4 Identifying digital competence gaps | <ul style="list-style-type: none"> - Knowledge of their own limitations in relation to the domain of digital media the characteristics and operation of digital media. - Ability to identify the needs for improvement in the use of digital media in their daily lives. - Awareness about their level of knowledge and digital competence and the repercussion in the accomplishment of formative, communicative activities.... |

Table 5: Basic indicators of the area of Problem solving

5. IMPLICATIONS/DISCUSSION.

The proposal of highlighted indicators of basic level presented in this work supposes an effort of selection and concretion of the indicators that form part of the model DIGCOM (Ferrari, 2013) to adapt them to the context of the competential development of the children that finalize the primary education (12 years).

In this sense, it is argued that children of this age to know how to search information through the Internet, evaluate and store it correctly. They must be able to use different technological means to communicate, share information and participate in online processes, collaborating with others at a distance, using the basic rules of conduct and properly managing their digital identity. They should also be able to create content and rework it respecting copyright. They must ensure the safe use of electronic devices, the protection of personal data, health and the environment. And, finally, they must be able to contribute to the solution of technical problems and to solve daily tasks making use of the technologies as well as to develop their creative capacity, being aware of their limitations in digital competences.

This model of validated indicators will serve as a basis, not only for the design of instruments for the evaluation of digital competence, but also for the development of training programs aimed at fostering this competence, which, as indicated, is crucial in the Literacy of today's society.

This model is in line with the proposal made by the National Institute of Educational Technologies and Teacher Training, which proposes a digital literacy model that allows teachers to support the acquisition of digital skills by

students, based on The theoretical contributions of Andersen (2009), Area (2008), Marqués (2008) and UNESCO (2008).

In this line, we also find the Ikanos (2015) project, developed by the Basque Government, within the Digital Agenda 2015 to disseminate and stimulate the acquisition of digital competences in citizenship, adapting the DIGCOM model to its objectives and offering a Proposal of self-evaluation in this competition through the Network.

Also related to this work is the interesting proposal of Pearson (2017) "Functional Skills ICT" that proposes a model of evaluation of digital competences and online consultancy.

6. CONCLUSIONS

Developing digital competence is a must in today's education, therefore students should be able to be informed, communicated, create content, make safe using the Internet and solving problems of their daily lives within the necessary digital tools and appropriate to their age.

Encouraging rigorous evaluation of this competence based on a validated model of indicators is the main contribution of the presented work.

REFERENCES

- ANDERSEN (2009) Technology Skills We Should Be Teaching in College. Retrieved from <http://busynessgirl.com/technology-skills-we-should-be-teaching-in-college/>
- AREA, M. (2008). Innovación pedagógica con TIC y el desarrollo de las competencias informacionales y digitales. *Investigación en la escuela*, 64, 5-18. Retrieved from http://www.eps-salud.com.ar/Pdfs/Innovacion_Pedagogica_con_Tics.pdf
- ÁVILA, H. L. (2006). *Introducción a la metodología de la investigación*. México: Eumed.net
- CASTRO, M. (2010). ¿Qué sabemos de la medida de las competencias? Características y problemas psicométricos en la evaluación de competencias, *Bordón*, 63(1),109-123.
- CODE, J., CLARKE-MIDURA, J., ZAP, N., & DEDE, C. (2011). Virtual performance assessment in immersive virtual environments. In

- Interactivity in e- learning: Case studies and frameworks* (230-252). IGI Global.
- COLL, C., MARTÍN, E., MAURI, T., MIRAS, M., ONRUBIA, J., SOLÉ, I., & ZABALZA, A.(1999).*El constructivismo en el aula*. Barcelona: Graó.
- DE LA ORDEN, A. (2011). Reflexiones en torno a las competencias como objeto de evaluación en el ámbito educativo. *Revista Electrónica de Investigación Educativa*, 13(2), 1-21.
- FERRARI, A. (2013). *DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe*. Sevilla: Joint Research Centre, Institute for Prospective Technological Studies. doi: 10.2788/52966
- INTEF (2016) Competencia digital. Retrieved from <http://formacionprofesorado.educacion.es/version/v2/index.php/es/competencia-digital/310-competencias-digitales-del-docente-del-siglo-xxi?showall=1>
- GOBIERNO VASCO (2015) Ikanos. Retrieved from <http://www.innova.euskadi.eus/ikanos/es/>
- MARQUÉS, P. (2008). Las competencias digitales de los docentes. Retrieved from <http://peremarques.pangea.org/competenciasdigitales.htm>
- MEDINA RIVILLA, A., DOMÍNGUEZ GARRIDO, M.C. & SÁNCHEZ ROMERO, C. (2013). Evaluación de las competencias de los estudiantes: modelos y técnicas para la valoración. *Revista de Investigación Educativa*, 31(1), 239-255.
- OCDE (2014). *Education at a Glance 2014. OECD indicators*. OECD Publishing. doi: 10.1787/eag-2014-en
- PEARSON (2017) ICT Functional Skills. Disponible en: <https://qualifications.pearson.com/en/qualifications/edexcel-functional-skills/Ict.html>
- RYCHEN D. S. & SALGANIK L. H. (Eds.) (2003). *DeSeCo's final report. Key Competencies for a Successful Life and a Well-Functioning Society*. Göttingen: Hogrefe & Huber Publishers.

- UNESCO (2008) Normas UNESCO sobre Competencias en TIC para Docentes. Retrieved from <http://www.oei.es/tic/normas-tic-marco-politicas.pdf>
- VAN DEURSEN, A. & VAN DIJK, J. (2011). Internet skills and the digital divide. *New media & Society*, 13(6), 893–911 doi: 10.1177/1461444810386774.
- VILLA, A. & POBLETE, M. (2008) *Aprendizaje basado en competencias. Una propuesta para la evaluación de competencias genéricas*. Bilbao: Ediciones Mensajero.
- VILLA, A., & POBLETE, M. (2011). Evaluación de competencias genéricas: Principios, oportunidades y limitaciones. *Bordón*, 63(1), 147-170.
- ZABALZA, A., & ARNAU, L. (2007). *11 ideas clave. Cómo aprender y enseñar competencias*. Barcelona: Graó.